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THE MASS-PRODUCED ARZ-49 RECEIVER

A. Komarov

During the postwar period, industry has developed and put on the market some 20 different models of radio receivers. But, with few exceptions, they were all second-class receivers. Only the Rekord belonged to the third class.

It is utterly impossible to consider this the proper ratio for the various kinds of receivers on the market. The greatest demand among the people is for cheap receivers which enable one to hear central broadcasting programs in all of European USSR. And it is precisely in this category that the consumer should have a wide latitude of choice. Yet the factories are putting out only one type of third-class receiver and none in the class of very low-cost mass-produced receivers.

Toward the end of last year, plant laboratories were charged with the task of correcting this deficiency and developing some mass-produced radio receivers of the simplest type. The first receiver finished was the ARZ-49, designed in one of the radio plants of the Ministry of the Communications Equipment Industry by a group of designers -- P. I. Kruchinin, S. V. Lykov, and V. M. Sobolev.

The ARZ-49 is a two-band superheterodyne receiver operating on a 110-220 volt AC line. The long-wave band is designed to receive radio waves from 730-2,000 meters long (410-150 kilocycles); the medium-wave band, 188-520 meters (1,600-520 kilocycles).

From the technical viewpoint, the ARZ-49 operates in the same manner as the Rekord, although it has only three tubes. The operating characteristics should also be better for this receiver than for the Rekord inasmuch as in the ARZ-49 there is no series connection of the tube filaments, and the tube rectifier, which often gets out of order, was replaced by a selenium pile. It is also preferable to the Rekord because of its power consumption -- not more than 40 watts on either 120 or 220 volts

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Circuit Design

The first tube (Type 6A10) is a converter. The second (Type 6B8), a duo diode-pentode, is used in a reflex circuit. It serves as an IF amplifier, a diode detector, and the first audio amplifier. The third tube (Type 30P1M) is the final audio amplifier.

An LC series filter, core-tuned to the IF frequency, is provided at the input of the receiver. The schematic diagram of the input section is exactly the same as that of the Rekord.

The IF voltage from the first-band filter is applied to the control grid of the 6B8 tube. The amplified IF voltage is then applied to the diode of this tube and the resulting audio signal appears across a load potentiometer which serves as a volume control. The voltage on the contact arm passes through a blocking condenser and the secondary of the first IF to the control grid of the 6B8 tube where it is amplified.

The "Arch" (automatic sensitivity control) voltage is taken from the load circuit of the 6B8 tube and is applied through a decoupling circuit to the control grids of the first two tubes (6A10, 6B8). It is applied to the grid of the first tube through the grid leak, and to the second grid through an RC decoupling circuit.

The audio load resistor in series with the plate of the 6B8 and the primary of the second IF is coupled to the grid of the 30P1M audio amplifier through a condenser. This completes the reflex cascade of the ARZ-49

The power-supply circuit and the manner in which the second tube is utilized are new for commercial receivers. The tube-plate supply and the screen-grid supply is furnished by a selenium rectifier. A selenium pile of the VS-35-13a type, consisting of 16 cells connected in series, functions as the rectifying device. The rectifier filter circuit is the same as that in the Rekord-47. The plate circuit of the output tube is supplied directly from the first filter condenser, while all other high-voltage circuits are supplied through a smoothing resistor and part of the primary winding of the output transformer. This part of the winding serves to filter out the AC hum. The operating principle of this type of filter was analyzed in Yu. Zinov'yev's article in Radio No 1, 1949.

For filament supply, an autotransformer is provided with two filament taps; 6.3 volts for dial illumination and the filaments of the first two tubes, and 30 volts for the filament of the last tube.

The receiver can be connected to either voltage through two protective devices. When the line voltage is 127 volts, the rectifier (the selenium pile) is connected directly to the line. When the line voltage is 220 volts, the entire autotransformer winding is switched across the line acting as a step-down transformer -- the rectifier receives 127 volts as in the previous case. The receiver has no special switch for 110 volts but will operate satisfactorily in the 127-volt position of the switch.

General Description of Receiver

The nominal power output of the receiver amounts to 0.6 watts when the coefficient of nonlinear distortion does not exceed 7 percent.

The sensitivity at 30 percent modulation and 0.06 watts power output is not less than 300 microvolts.

The selectivity is characterized by a falling off of not less than 20 decibels for 10-kilocycles detuning.

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The reduction in the image channel at the higher frequencies of both bands, as well as of a signal with a frequency equal to the intermediate frequency, is not less than 20 decibels.

The frequency pass-band for all parts of the receiver including the loudspeaker (measured by sound pressure) has a range of 200 to 3,000 cycles per second for a discontinuity of plus or minus 10 decibels.

The automatic sensitivity control guarantees constancy of output voltage within the limits of plus or minus 10 decibels, during variations in input voltage of 5,000 to 100,000 microvolts. The sensitivity of the adapter inlet with nominal output voltage is 0.25 volts.

The intermediate frequency is 110 kilocycles. The performance of the receiver is stable during variations in line voltage of plus or minus 15 percent.

Construction

The receiver is mounted on a metal chassis. Practically all the large parts are located on the horizontal upper part of the chassis, the small parts and connecting wires on the lower side.

The control knobs are located on the front panel. The knob on the left functions as a switch and volume control, the center knob as the tuning control and the right knob as the band switch. The jack for the antenna and adapter is at the back. The receiver must not be grounded.

Many parts are the same as those of the Rekord-47. The dial is circular with a pointer attached at the center. A Type 1-GDM-1.5 dynamic loudspeaker is used.

This is the first cheap, mass-produced broadcast receiver. The designers have taken great pains to make it as efficient as possible. There is, of course, no objection to employing a reflex circuit in this type of receiver with few tubes. The general performance of the set is all the more satisfactory because its actual specifications are somewhat better than those originally established which carried only a minimum guarantee under commercial conditions. The receiver is fairly sensitive, but, under city conditions, it cannot be expected to receive a great number of stations. The main reason for buying such receivers is to receive broadcasts from local stations and from powerful broadcasting stations in European USSR.

/Original document, available in CIA, shows external view of set, front and rear views of chassis, and a circuit diagram./

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